Innovation: artificial reefs made from empty shells to preserve biodiversity

Caen October 4, 2013 - Official Launch of RECIF European project aiming to find re-use solutions for marine by-products in artificial reefs.

The RECIF project is part of the process to improve the ecosystem and the management of marine resources on both sides of the Channel . To respond to these major economic, environmental and heritage issues this project has several objectives: resource development and marine byproducts (empty shells), development of innovative building materials for artificial reefs, and the establishment of an artificial reef to improve the biodiversity and production of the marine ecosystem of the Channel. The RECIF project selected under the European cross-border cooperation program INTERREG IV A France (Channel) / England, is co-funded by the European Union (ERDF) and the Région Basse-Normandie with 2,7 million €. It brings together eight French and British partners, RECIF is led by ESITC Caen and ends in 2015.

The challenges of RECIF project

As the second largest producer of shellfish in Europe, France has an important position in the field of shellfish farming. It produces an annual average of nearly 200,000 tons of shell materials from shellfish and 50,000 tonnes of shell materials from fishing. Both Normandy and Brittany are the largest producers of shellfish marine by-products such as scallops and oysters. In addition to this, there is massive quantities of slipper limpet which is estimated at several million tons on the coast of Brittany, Normandy and Vendée.

The shells without the flesh represent nearly 90% (by mass) of the products and are considered a waste. Studies and research around the world have focused on the development of building materials made primarily from oyster. The shell by-products are a local resource value as secondary raw material for the production of new materials with specific properties and uses. Among them, an eco- draining pavement is being finalized under the project VECOP (ESITC Caen et al. 2013) and a material for artificial reefs is in the development phase.

Work packages

The RECIF project 's primary objective is to respond to a major issue facing the fishing and shellfish industries: the management of shellfish waste from the sea. The aim is to develop the re-use of shell by-product industry whist providing a positive solution to the development of the marine ecosystem. The other main challenge of this project is to understand the role of reefs in the phenomena of development in improving the biodiversity of the ecosystem in the Channel.

The program is structured around five areas: the study of materials and engineering reef, the environmental impact of artificial reefs, the identification of ecosystem immersion, the production and installation of artificial reefs areas, the environmental monitoring process colonization of artificial reefs, the communication objectives and main results of the

project. These actions are carried out jointly with all partners. The work areas are interdependent and the results are transferable. Franco-British partnership is present at all levels of the RECIF project through a combination of the skills of French (University of Caen Basse-Normandie, Caen ESITC , National Museum of Natural History, and TPC EMCC) and English (Plymouth Marine Laboratory , University of Southampton and University of Exeter) partners. This cross-border collaboration promotes the transfer and sharing between partners, results and knowledge of a Franco-British issue.

The RECIF project will end in June 2015 after the immersion of an artificial reef in the English Channel and the environmental monitoring of its impact on the marine ecosystem.

The partners

The RECIF project, led by the ESITC Caen includes 8 partners Franco-British:

ESITC Caen is a influential engineering school specializing in construction and pioneer in sustainable building. ESITC Caen aims to develop skills, provides knowledge and triggers eco-friendly behavior. This specificity is related to the presence in the school of a Research laboratory whose work focuses on materials and eco-friendly building materials, taking into account their environmental impact and their technical performances: Materials and Eco-construction: development of eco-materials from co-products such as vegetable fibers (flax), marine-products (shellfish) or demolition aggregates. Environmental Geotechnics: treatment and recovery of soils and sediments for the field of construction. www.esitc-caen.fr

EMCC, French market leader in maritime and river works
The company EMCC is a branch of the VINCI Construction France group and is specialized in maritime and river works. The country's main dredging company, EMCC is a market leader in the fields of maritime civil works and port developments, underwater civil works, repairs or construction of engineering works in rivers as well as the installation of ducts or outlet streams.
With a wide experience and stock of equipment which is considered as the largest in France, EMCC is not only a valuable partner for maintenance works on waterways and ports across the country, but also for the construction, creation or deepening of ports on an international level. With its integrated design and methods office, the company is able to propose clients environmentally friendly design-construction projects. The company has an annual turnover is 81 million euros and 330 employees. http://www.entreprise-emcc.fr

Exeter University combines world class research with excellent student satisfaction at its campuses in Exeter and Cornwall. It is a member of the Russell Group which represents 24 leading UK universities committed to maintaining the very best research, an outstanding teaching and learning experience and unrivalled links with business and the public sector. Formed in 1955, the university has 18,000 students from 130 different countries. Its success is built on a strong partnership with its students and a clear focus on high performance. Exeter was voted the Sunday Times University of the Year 2012/13. It is ranked amongst the UK's top 10 universities in the Higher Education league tables produced by the Times, the Guardian and the Sunday Times. It is also ranked amongst the world's top 200 universities in the QS and Times Higher Education rankings. http://www.exeter.ac.uk

The National History museum / Dinard's marine station : At the crossroads of Earth, Life and Human sciences, the museum has been dedicated to studying biodiversity and geodiversity on a daily basis for over 350 years. As a research centre, the Museum bases its work on field and laboratory studies, a multi-disciplinary approach as well as its exceptional collections – amongst the three largest in the world – and its renowned expertise. The museum's educational work as well as its vocation to share the knowledge it has gained through its various galleries, zoological parks and botanical gardens, has become an important channel for sharing information and making the public more aware of the need to protect our planet. The Institution brings together almost 1,900 people including 500 researchers, trains around 350 students every year and houses 68 million specimens in its storage areas and galleries. Over 2 million people visit the 12 sites around France each year. www.mnhn.fr

Plymouth Marine Laboratory (PML) PML is an independent, impartial provider of scientific research and contract services for the marine environment, with a focus on understanding how marine ecosystems function and reducing uncertainty about the complex processes and structures that sustain life in the seas and their role in the Earth system. As a truly multidisciplinary marine research centers, PML delivers highly innovative research and solutions for national and international marine and coastal programs. The research at PML is timely and highly relevant to UK and international societal needs and its research, development and training programs have a mission to

contribute to issues concerned with understanding global change and the health and sustainability of marine ecosystems. www.pml.ac.uk

Ocean and Earth Science, University of Southampton, UK

The University of Southampton has a well established reputation for its outstanding research and degree courses in Ocean and Earth Science. Our students are based at the prestigious National Oceanography Centre Southampton (NOCS). NOCS is the integrated collaboration between the Southampton-based part of the Natural Environment Research Council's National Oceanography Centre, and the University of Southampton's Ocean and Earth Science. The Centre hosts one of the world's largest groups of scientists and engineers devoted to research, teaching and technology development in ocean and Earth science. The Centre is comprehensively equipped with modern instrumentation and laboratory facilities and is also the operational base for the UK's fleet of deep sea research vessels. http://www.southampton.ac.uk/oes/index.page

University of Caen Basse-Normandie

Three research units (RU) of UniCaen are involved in the RECIF project. The CNRS INEE - FRE3484 BioMEA RU "Biology of marine molluscs and associated ecosystems", the CNRS M2C (UMR 6143) RU "Continental and coastal morphodynamics" and the LUSAC EA 4253 RU "Applied sciences laboratory of Caen Basse-Normandie university in Cherbourg". The RECIF project involves the FEME team (Functioning of operated marine ecosystems) of the BioMEA RU. This team, specialized in the coastal ecosystems functioning, works mainly on 3 items: i: primary producers, ii: trophic interactions, iii: anthropic pressure effect. The M2C RU is interested in the ocean/continent interface from the watershed dynamics to the adjacent coastal zones evolution. One of the issues is to isolate the impact due to natural factors from the anthropic ones and the consequences on the coastal and continental environments based on an integrated multidisciplinary approach associating mechanic-geosciences and geo-eco-microbiology and the experimental and modeling *in situ* approaches. LUSAC brings together complementary competences in the scientific fields of thermal and fluids mechanics, of materials for energy and electronics, and of thermal energetic systems and electrical energetic systems based on alternative energy sources (marine renewable energy, fuel cells, electrical energy storage, etc…). BioMEA and M2C are members of the CREC (Reseach center on coastal environment – Luc-sur-Mer marine station - University of Caen) which structures and means for the sea will be mobilized for the RECIF project. http://www.unicaen.fr

TPC

TPC is a subsidiary company of VINCI Construction France. It's specialized in civil engineering, maritime and port work, building, earthwork, demolition and asbestos, pipes and utilities and quarries. Located in Tourlaville, Lower Normandy, the company brings support to its customers from design to maintenance, through installation, financing and implementation. It regularly carries out precast structures of wide floating size, but not exclusively, within maritime and port projects (reefs, Jarlan Caisson, …etc). The TPC company is certified for its quality management system (ISO 90001 – 2008), its security management system(ILO – OSH 2001), work under ionizing radiation (E certification of CEFRI), for asbestos removal (ASCERT certificate). Operating throughout the western part of France, TPC claims 130 employees and a yearly 20 million euro turnover. http://www.entreprise-tpc.fr

Public relations Contact:
Marie-Caroline Coubé, communication@esitc-caen.fr